

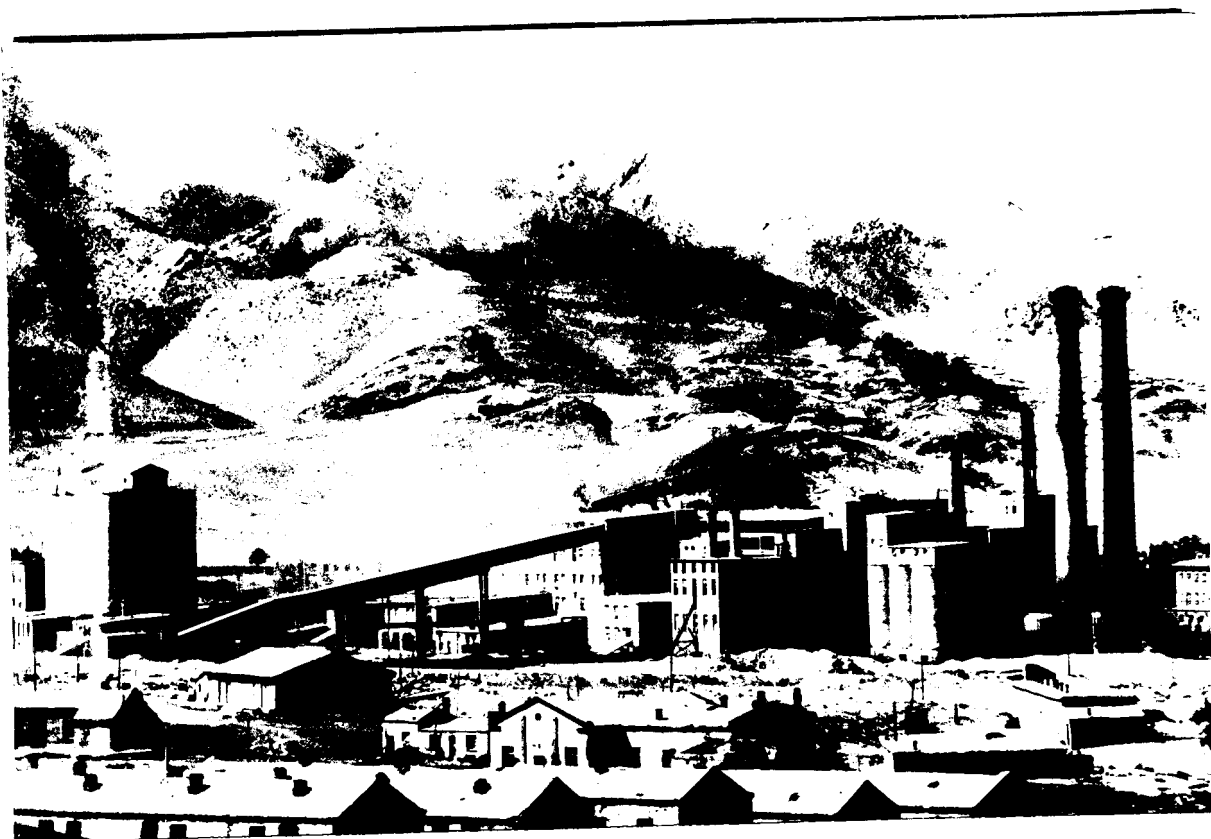
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New plants are being built in a series after the liberation in Sinkiang where no modern plant existed before the liberation. The photo shows the Sinkiang Cement Plant.

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## INFORMATION REPORT INFORMATION REPORT

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Photographs

CIA 1111360 Chu-chiang (23 07N 113 17E) - Paper Plant, Kuang-chou. Produces offset paper from sugar cane residue.  
 CIA 1111361 Kuang-chou Paper Plant - Finnish-built machinery. Largest newsprint plant in China, with 100,000 ton capacity of pulp and newsprint.  
 CIA 1111362-364 Nan-ping (26 40N 118 09E) - Pulp and Paper Plant.  
 CIA 1111362 - Log dump.  
 CIA 1111363 - Wood grinding shop.  
 CIA 1111364 - Long net multiple drying-cylinder paper machine.  
 CIA 1111365-367 Chia-mu-ssu (46 50N 130 25E) - Pulp and Paper Plant.  
 CIA 1111365 - Overall view of plant.  
 CIA 1111366 - Twin net electric cable paper machine.  
 CIA 1111367 - Storage area for cement bag paper.

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# THE DEVELOPING CHINESE PAPER-MAKING INDUSTRY WHICH IS EXPLOITING NEW RAW MATERIAL SOURCES

The Chinese paper-making industry increased production in the latter half of 1965 20 percent over the same period of the previous year, and at the beginning of December overfulfilled the year's production plan ahead of schedule. At the same time, it strengthened management and generally increased product quality by such things as using sediment removers, greatly reducing the dustiness of paper and increasing the whiteness of writing-paper.

Chinese paper production was a maximum of 165,000 tons in 1943 in old China and in 1949 with establishment of new China was 108,000 tons, but in 1958 it was 1,220,000 tons (in addition, 410,000 tons of native paper), and in the following year of 1959 became 2,130,000 tons (including native paper). Development during this period was chiefly brought about by construction of "foreign method" plants centered on 10 large-sized paper-making plants which used foreign equipment - Kuang-shou (Soviet aid), Chia-mu-ssu (Soviet aid), Chi-lin (Soviet aid), Nan-ping (Soviet and East German aid), I-pin, Kaishantun, Shihhsien, Yingkou, Kincheng, and Tientsin - and construction of nearly 1,500 small-sized paper-making plants using "native methods" with a daily output of one to five tons. (Of 1959 total production, about 60 percent was done by medium and small-sized enterprises). (For details, see No. 27 of these reports dated 1 September 1964).

## Wood Pulp Comprises Only 30 Percent of Raw Materials

In the adjustment period from 1960 to the present, the great task of the Chinese paper-making industry has been development of raw material sources. Raw materials used by Tsai Lun of the Later Han Dynasty, who is said to have originally discovered paper in the world, were bark, flax, rags, and old fishing nets. However, foreign paper which developed rapidly after the new China used as its chief raw material wood pulp, and moreover limited kinds of wood, and was not suitable for the situation in which China's lumber resources are not very abundant and moreover other branches of industry require great amounts of lumber. Consequently, looking at China's machine-made pulp production for example, in data from 1952 to 1957, reed pulp occupies generally more than one-fourth or to the extent of one-third. Also, according to approximate statistics for 1955 to 1964, raw materials for paper-making of 790,000 tons of rags, 560,000 tons of old shoes, 150,000 tons of scrap flax, and 2,000,000 tons of scrap paper were purchased in various regions. This can altogether manufacture 1,500,000 tons of paper and corresponds to 9,510,000 cubic meters of lumber.

In addition, such things as rice straw, wheat straw, sugar-cane residue, pampas grass, and straw grasses are actively being developed as paper-making raw materials. For example, pampas grass, which has recently been made use of as a side-line in farm villages, according to investigation of the four province districts of Chekiang, Kwangtung, Kwangsi, and Fukien, has resources of three times the production amount of reeds used in the entire country's paper-making, and if 50 percent or 1,000,000 tons of existing pampas grass resources can be utilized, it is said that 400,000 tons of writing-paper can be produced.

Thus, China's paper-making raw materials in 1962 consisted of 70 percent non-wood fibers and 30 percent wood fibers, of which the breakdown was 35 percent herbs (rice straw, wheat straw, etc.), 15 percent wastes (wastepaper, rags, etc.), 20 percent reeds and rushes, 3 percent bamboo, and 27 percent wood (1,200,000 cubic meters).

This development of raw material sources is not limited to medium and small enterprises but is also being diligently undertaken in large plants, and even in modern plants which make wood pulp the chief raw material, the question of changing raw materials is gaining great results.

The state-operated Chia-mu-ssu Synthetic Pulp and Paper-manufacturing Plant in Heilungskiang Province is a modern plant which was completed in July 1957 with Soviet aid and is the first plant in China which manufactured pulp and paper by means of the salt of sulfuric acid method. This plant chiefly manufactured high-grade paper for industrial use and was built completely on the basis of foreign design, and according to that design, this plant had to use white pine as its chief raw material and moreover had to use standard lumber 60 centimeters long with a diameter of 30 to 50 centimeters and with no bends and with less than a certain number of knots. However, China's wood resources are not abundant, and excellent pine and cryptomeria are valuable. Far from using white pine in paper-making, it was in the situation of having to even use good red pine in construction. Thereupon, this plant opened up the course of using coarse raw materials.

The first difficulty in changing raw materials was the transportation system. Formerly, lumber brought to the plant was standard material of uniform size and standards, and not requiring processing, it could be directly taken from cars by cranes and placed in the lumber storage yard. However, lumber which is at present brought to the plant is of all sorts, and there is both wood of more than one meter diameter and items thin as a teacup, and the kinds and standards are varied and must be stored separately. Thus, the heavy cranes were of no use. For the purpose of overcoming this difficulty, employees produced one bridge-model crane with their own hands, using the method of combining native and foreign methods. Using this convenient crane, it has been possible to of course load and unload lumber, and, in accordance with standards, freely select lumber and place it separately. This creation increased working efficiency several times.

#### Renovating Equipment So Various Raw Materials Can Be Handled

The next difficulty was the lumber workshop. The machinery and processes here were originally designed to use good quality raw materials, the lumber being smooth like seamless steel pipe and having to be uniform, and many machines could only operate with good-quality raw materials. After being made to use miscellaneous lumber, this plant's puller, debarkers, sawing machines, grinders, and other equipment, continually broke down. The puller with a total length of 180 meters daily broke down on every shift, and one time's repair took from 30 minutes to 2 hours. When this stopped, the entire plant had to wait for material. The workers repeatedly studied and remodelled the puller, next making a splitter and a circular saw and taking out the former debarker which could not debark material which was too thick or too thin, further rationalizing the production process. The remodelled puller pulls the lumber like a long dragon and smoothly places it in the lumber storage workshop. The labor of cutting, splitting, and timber grinding up to sending it to the pulp workshop, has been reduced by half as compared with before, and the production amount has doubled.

#### Soda Recovery and Other Problems are Solved

In using poor timber, knots became numerous in the pulp-manufacturing process. As the result of their adopting the method of the three consolidations of workers, technicians, and management, and repeatedly making tests, they finally devised a method of separating the flow of knots from pulp manufacture, and an important problem which had long influenced the production amount and quality of paper pulp was solved.

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Also, when production is excessively increased and waste materials are used, recovery of soda becomes very bad. However, they also overcame this problem and greatly reduced the amount of soda used which accounts for 25 to 30 percent of the paper-making cost. Thinking of all kinds of methods, they persistently sought for production rules, and reconstructing the more than 3,000 pipes of the five evaporators, they improved the fluid injection method in the converter, and finally, recovery of soda greatly exceeded the design level.

#### Success in Using Not Only Red Pine But Also Larch

This plant previously considered that manufacturing wrapping paper with red pine was a great accomplishment in the paper-making industry, but now they are not only making paper with material of the class of red pine, but they are producing several tens of kinds of high-grade paper with bark which cannot be processed, decayed wood, and other bad quality materials. Aside from the fact that they are conserving more than 300,000 square meters of good quality lumber every year at this plant, paper for industrial use which has been produced is evaluated as first-class and the produced amount has also exceeded by about 20 percent the original designed production amount. With this great reform, labor productivity has greatly increased and the number of employees has decreased to 3,000 from the previous 5,000. In 1963 when plans for the following year were discussed, it was thought it would be difficult to fulfill a plan of daily production of 53 tons of paper, but the accomplished amount of 1964 reached more than 64 tons.

For the purpose of opening up raw material sources, in 1964 the plant, absorbing advanced experience of foreign countries, succeeded in using larch. After making wrapping paper mixed with larch, they visited such places as factories, farm villages, wharves, and freight stations, making on-the-spot investigations, and by exploring questions of quality when wrapping paper is actually used, they are adding improvements. As the result of investigation over a long time, they have sought out the correct ratio of mixing larch, and the quality of wrapping paper made at this ratio is even better than that made with white pine and red pine.

#### Sugar-Refining Plants Joining Facilities With Paper-Making Plants and Using Sugar-Cane Residue

Sugar-cane residue is also used in other countries as a raw material for paper-making, but in China, in addition to using sugar-cane residue which was previously generally disposed of as fuel and waste material as a paper-making raw material, by combining facilities of paper-making plants with sugar-refining plants, they are trying to make use of it in management rationalization of the sugar-refining industry.

The sugar-refining industry of Szechwan Province began tests in 1958 of making paper with sugar-cane residue. At that time, by means of experiment evaluation, it was discovered that fiber contained in sugar-cane residue reaches more than 50 percent and moreover the fiber is thin and long and is an excellent raw material for paper-making. However, at first only cardboard could be manufactured using this. After that, by means of several years of constant research and improvement, it gradually became possible to use sugar-cane residue as a raw material for good-quality paper. In 1965, in six large and medium-sized sugar-refining plants, subsidiary sugar-cane residue paper-making workshops were built, and several kinds of good-quality paper were made using sugar-cane residue including typing paper, writing paper, rolled paper, and poster paper, and annual paper production approached 10,000 tons. In the first half of 1965, more than 4,000 tons of various kinds of paper were produced and supplied to Szechwan Province as well as East China and the Northwest region.

Sugar production, being seasonable, generally has one sugar extraction period from the end of autumn after the sugar cane matures until the spring cultivation. Thus, in making paper using sugar-cane residue at the various sugar-refining plants there is no need to build a new furnace, and moreover, during the quiet season in sugar-refining, they use the sugar-refining personnel and some of the facilities. For example, the Neichiang Sugar-Refining Plant which has the largest output of paper using sugar-cane residue, supplied all the water and electricity necessary in paper-making by means of facilities which are basically related to sugar-refining, and the four paper-making machines, excepting the motor and rubber rollers of the drying facilities, were all manufactured by sugar-refining machinery equipment repair workers. Since the manufacturing process of sugar-refining and paper-making are relatively similar, workers of the various paper-making processes hold additional posts as sugar-refining workers.

#### Many Advantages of Paper Using Sugar-Cane Residue

As of July 1965, the sugar-refining industry of Szechwan Province had a daily output capacity of 30 tons of paper made with sugar-cane residue. Since personnel and facilities of the sugar-refining industry are used considerable, investment is reduced by more than half as compared with building paper-making plants of the same productive scale. In sugar-refining plants which are carrying out such combined usage, losses of seasonal production with half-year operation and half-year suspension of operation are compensated for, administrative and supervisory expenses are also relatively reduced, it is advantageous in reduction of sugar-refining costs, and it increases national income. In comparing the Yinshan Sugar Refinery and the Chiuchiho Sugar Refinery which are of the same size and the same type, both plants met the state sugar-refining plan for 1964, but profit paid to the state for paper-making alone by the Yinshan Sugar Refinery was 700,000 yuan (105,000,000 yen) greater than the Chiuchiho Sugar Refinery, and moreover, the cost per ton of sugar was 24 yuan (3,600 yen) less than the Chiuchiho Sugar Refinery which does not use sugar-cane residue. At present, in Szechwan Province, at the same time they are increasing the quality of paper and increasing the kinds, they are striving to further expand manufacture of paper using sugar-cane residue.

Kwangtung Province, in which the paper-making industry flourishes, is a principal producing region for sugar cane, and here also, sugar-cane residue is used as a raw material for making paper. The Chu-chiang Paper-Making Plant which has been newly-constructed in Kuang-chou has been producing good-quality offset paper with sugar-cane residue as the principal raw material since February 1965. China originally had no foreign data for reference concerning making offset paper with sugar-cane residue as a raw material. However, in behalf of economizing lumber, the plant made repeated experiments, overcoming various difficulties, and finally in February 1965, using 70 percent sugar-cane residue and 30 percent Mawei pine pulp, they succeeded in producing offset paper which met standards.

#### Producing High-Grade Thin Paper Using Wheat Straw Completely

Rice straw and wheat straw are quite abundant paper-making raw materials in China. Small-sized paper-making plants of various places, by means of technical reorganization, have already grasped the technique of making pure white writing-paper using wheat straw or rice straw completely as raw materials.

wood pulp had to be used as raw material for high-grade thin paper, but employees of the Tsinan Paper-Making Plant boldly broke through this old framework, and using backward facilities of 30 years before, at the end of 1963 for the first time in China, successfully trial-manufactured 22g high-grade thin rolled paper using wheat straw as raw material. After that, a new road was opened up using wheat straw as raw material for high-grade paper in the Chinese paper-making industry. In 1964, employees of the same plant continually and persistently advanced trial-manufacture and manufactured high-grade thin rolled paper of a weight of 21 grams per square meter, rolled paper of similarly 18 grams, envelope paper of 20 grams, and other high-grade thin papers. In 1965, again working at full energy, they succeeded in making still whiter and stronger 18-gram special envelope paper with wheat straw. Aside from the fact that the one quality characteristic of degree of rupture of this high-grade paper is still not ideal, the various other quality characteristics all reach stipulated standards. Since the Chi-nan Paper-Making Plant began to use wheat straw as raw material for high-grade thin paper, in about one and a half years 1,500 cubic meters of lumber and more than 400,000 yuan of transportation expenses have been economized.

This accomplishment of the Chi-nan Paper-Making Plant is regarded highly by the Chinese paper-making industry, and as of June 1965 more than 200 units of 16 provinces and cities throughout the country had one after the other sent persons to study at the plant, and more than 80 plants have succeeded in manufacturing thin rolled paper using wheat straw completely or partially.

#### Mixing Short Fibers in Cigarette Paper

The Shantung Paper-Making Plant in 1965 mixed short fibers in cigarette paper, reducing the cost 10 percent and moreover remarkably increasing quality. Prior to this, the same plant, when making cigarette paper, mixed partly rope, tattered jute bags, and old fishing nets with pulp of such needle-leaf trees as conifers, and they had not broken out of the framework of the old idea that in manufacture of high-grade paper such as cigarette paper long fiber pulp must be completely used. At the end of 1964, the plant organized a group of people and sent them to study at the Hangchou Paper-Making Plant, and there they saw and learned that cigarette paper is made mixing short fibers of such things as wheat straw and bamboo with long fiber pulp. After returning to the plant, they studied making cigarette paper by mixing discarded material of the Tsinan Match Plant. This had problems such as that the fibers were short and that the degree of rupture was difficult to increase, but they repeatedly experimented, and taking suitable steps, finally succeeded in making pulp which qualified. The rate of wood waste mixed in cigarette paper by this plant comes to 35 percent, and by means of this, the plant annually economizes a large amount of good quality wood material.

#### Paper-Making Raw Material of Abundant Resources - Straw Grasses

In the extensive hill and mountain districts of Szechwan Province, straw grasses grow wild everywhere and the resources are very abundant, but heretofore, this straw grass, aside from that used to make straw sandals and rope and the small number of farm-village small-sized paper-making plants which have used this for making comparatively low-grade paper, has been largely used as firewood and burned. However, this straw grass is being used in large quantity by the Chung-ching Paper-Making Plant as a raw material for high-grade paper.



The Chung-ching Paper-Making Plant previously used bamboo and wood as raw materials in making high-grade paper, but in the second quarter of 1964 they fixed their attention on straw grasses and conducted experiments of making high grade writing-paper mixing straw grass pulp with wood pulp. By means of one year of facts, it was proved that high-grade writing-paper made mixed with 60 percent of straw grass had good strength, low transparency, small variation, and other excellent points. This success not only raised the economic value of straw grass and brought the great advantage of increasing farm village side-work income, but opened up an abundant source of raw material for the paper-making industry.

The Paper-Making Industry Opens Up a Broad Future Which Is Suitable for China's Actual Circumstances

It has previously been touched on that rushes and reeds occupy an important position as raw materials in China's paper-making, and in Liaoning Province which has abundant resources along the coast, 21 paper-making plants including those in Kincheng, Shenyang, Chinchou, and Yingkou, produce paper using 80 percent reeds and rushes. Moreover, as a result of various plants having conducted technical innovations, paper made with rushes and reeds, in its whiteness and other aspects, approaches paper made with wood as raw material, and several kinds of the paper have also gained good reputation in foreign countries.

The above trend of China's paper-making industry is not a negative thing of searching for substitute products because wood resources are not abundant but is a positive thing having conformed to the policy of socialist construction by developing techniques suitable to China's resources and other actual conditions, and by establishing a system. From manufacturing machines and equipment suited to processing such things as reeds and rushes, sugar-cane residue, rice straw, wheat straw, pampas grass, and straw grasses, establishing processing methods and production systems, and reorganizing everything, as workers of the Chiamussu Paper-Making Plant say, they are truly changing the "stomach" to conform to their country's actual circumstances and conducting constitutional improvement. At present, China's paper-making industry has accomplished self-supply and is partially turning to export, but henceforth, as China's socialist construction advances, the demand for paper will become increasingly great and the production task of the paper-making industry will also become great. With the Third Five-Year Plan which began this year, China's paper-making industry, following this road, will probably accomplish still greater development.